

improvements would be necessary. The project also would significantly increase energy costs for facility operations. When a detailed proposal has been formulated, numerical modeling and simulation studies would be conducted to examine the benefits and impacts on the Delta, fisheries, the export water users, and physical systems. If the results appear promising and consistent with non-degradation policies, a demonstration project would be implemented.

Salt Disposal

Salt disposal requires transport out of the valley, long-term in-valley storage, or use of residual salts as a commodity. Currently, the San Joaquin River is the conduit for out-of-valley salt disposal. Reducing water quality impacts of this disposal on the San Joaquin River and Delta could ultimately require construction of an out-of-valley drain or other conveyance mechanism to transport salt from the San Joaquin Valley. An out-of-valley drain could convey saline water to the Pacific Ocean either directly or through the Bay and Delta.

- **Recommended actions:** The out-of-valley drain proposal is very controversial, with suspected negative ecological impacts, and therefore is not recommended as a priority action.

Information Needed

Water Quality Objectives

To establish water quality objectives, the RWQCB needs information on the effects of elevated salt concentrations on the beneficial uses. Monitoring of the spatial and temporal extent of elevated salts, coupled with special studies to determine effects of elevated salts, will provide the necessary information for establishment of water quality objectives. CALFED should support the monitoring and studies.

To establish water quality objectives, the RWQCB needs information on the effects of elevated salt concentrations on the beneficial uses.

Improved Quality of Supply

Information on CALFED alternatives can be found in the Programmatic EIS/EIR, and information on the south Delta barriers can be found in DWR's Draft EIR/EIS (DEIR/EIS) for the ISDP. DWRDSM modeling performed subsequent to release of the DEIR/EIS depicts salinity changes due to ISDP for 71 years of hydrology. No detailed feasibility analysis has been conducted for the DMC circulation proposal. The impact analysis in Section 5.3 in the CALFED Programmatic EIS/EIR contains data on the water quality of supply water from the Delta. Additional modeling work would be required to estimate the long-term impact of

improved water supply water quality on agricultural drainage salt loading to the Delta.

Real-Time Management

Modeling studies have been conducted to forecast potential opportunities for river discharge. The CVRWQCB published a report on the water quality data in the San Joaquin River from 1985 to 1995.

The techniques required to collect and transmit flow and stage data are well established. In California, public water agencies such as DWR, Reclamation, and the USGS measure flow and stage routinely for a variety of applications. The California Data Exchange Center, a branch of DWR, provides river stage and flood warning information on a real-time basis. The major clients of this system are local and state agencies concerned with flood management and the provision of emergency services. Agencies such as the Corps use this information to determine reservoir release schedules during high runoff periods.

The real-time water quality management system under development for the San Joaquin River Basin takes advantage of some of the features of the existing hydrologic data acquisition and forecasting programs. Unique aspects of the real-time water quality management system that are not replicated by current programs are:

- Use of automatic electronic water quality sensors. Currently, only EC, temperature, and pH are continuously logged. A number of other constituents of concern that are present in California's river systems cannot be measured on an automatic level.
- A continuous and integrated system of data error checking and validation because the data are used for regulatory purposes.
- Addition of control systems that can be used to manage agricultural and wetland drainage water flow and water quality.
- Institutions that coordinate actions and responses of regulators, operators, and other public and private entities; and long-term commitment by agencies to support real-time data collection and water quality forecasting efforts.

The real-time water quality management system under development for the San Joaquin River Basin takes advantage of some of the features of the existing hydrologic data acquisition and forecasting programs.

Recirculation of Delta-Mendota Canal Water

Preliminary modeling results are available for reduction of fish flow releases due to proposed DMC circulation and reoperation of discharge of drainage water to the river. Further studies of water quality effects are needed to determine the

proposal's technical feasibility and its consistency with state and federal non-degradation policies for water quality. Studies also are required to determine whether this action could be incorporated into the operation of the CVP. It is understood that the current configuration of the physical systems may not support such a project and that considerable improvements would be necessary.

Salt Disposal

Considerable data show a salt imbalance in the San Joaquin Valley, but more work must be done to fully assess the feasibility of salt storage or marketing and the impacts of drainage at specific locations.

Considerable data show a salt imbalance in the San Joaquin Valley, but more work must be done to fully assess the feasibility of salt storage or marketing and the impacts of drainage at specific locations.

Existing Activities

Improved Quality of Supply

Operation of south Delta barriers to improve fish migration and water levels in Old River, Middle River, and Grant Line Canal restrict the diversion of San Joaquin River water into south Delta channels and can help to improve water quality in some locations. The ISDP proposes to install flow-control structures to improve water levels and circulation in south Delta channels. Water quality in the south Delta is influenced in varying degrees by natural tidal fluctuation, San Joaquin River flow and water quality, CVP and SWP export pumping, local agricultural diversions and drainage water, inadequate channel capacity, and regulatory constraints. When the CVP and SWP are diverting water, water levels in local channels can be drawn down, affecting the availability of water at local diversion points. In combination with tidal cycles, diverging and converging flows can occur in some channels, creating isolated "null zones," areas where net flows over a complete tidal cycle approach zero. Because of the generally poor quality of water coming down the San Joaquin River, and because agricultural diversions discharge poor-quality water into channels that are narrow and shallow, isolated portions of channels where null zones or low flows occur can become stagnant. Therefore, the south Delta flow-control structures are being proposed to improve water levels and water circulation in south Delta channels, to eliminate null zones, and to correct water circulation problems in south Delta channels that result from the SWP and CVP operations.

When the CVP and SWP are diverting water, water levels in local channels can be drawn down, affecting the availability of water at local diversion points.

The three CALFED conveyance alternatives, if modified to provide water of good quality for the south Delta, CCWD, and export south of Delta, would improve water quality. These alternatives are not discussed in this report. No drainage discharge point relocation has been identified, but CCWD proposes elimination of the Veale Tract agricultural drainage into Rock Slough and reduction of the local drainage into Old River in the vicinity of the district's intake.

The three CALFED conveyance alternatives, if modified to provide water of good quality for the south Delta, CCWD, and export south of Delta, would improve water quality.

Opportunities for real-time management of drainage discharge are being explored. CALFED has recently funded a project by the SJRMP-WQS (consisting of staff from DWR, CVRWQCB, and LBNL) to conduct studies of real-time water quality management. Past analysis using mass balance models of the river suggest that considerable opportunity exists for improved coordination of drainage discharges and reservoir releases to more efficiently use the river's assimilative capacity for salts.

The SJRMP-WQS was awarded a grant in 1994 to demonstrate that improved management and coordination of tributary releases and agricultural drainage from west side sources could significantly reduce the frequency of violations of water quality objectives for salinity, selenium, and boron on the river. The SJRMP-WQS developed a decision support system that retrieves current flow and water quality data and allows forecasts of river assimilative capacity to be made for salinity at Vernalis. These forecasts will become increasingly useful to water districts and other agencies for timing and coordinating flows and loads from agricultural fields, wetlands, and wildlife refuges on the west side with east side reservoir releases for salmon migration, recreation, and water quality.

The SJRMP-WQS developed a decision support system that retrieves current flow and water quality data and allows forecasts of river assimilative capacity to be made for salinity at Vernalis.

Salt Disposal

The SWRCB's DEIR for Implementation of the 1995 Bay-Delta WQCP, November 1997, Chapter VIII states:

The existing CVRWQCB Basin Plan states that there are two major options for the disposal of salts produced by irrigated agriculture: out-of-valley export and discharge to the San Joaquin River. The plan states that a valley-wide drain remains the best technical solution to the water quality problems of the San Joaquin River and Tulare Lake Basins caused by agricultural drainage. (VIII-14.)

Some districts in the San Luis Unit of the CVP have been engaged in litigation against Reclamation, claiming that Reclamation is obligated to provide drainage facilities. This matter was decided in favor of the plaintiffs and is currently before the federal court of appeals. Several parties interested in water quality of the delta were jointly opposed to the construction of a drainage facility. In a related matter, Westlands Water District (WWD), Reclamation, and the SWRCB began preparing an MOU two years ago, whereby WWD, SWRCB, and Reclamation would proceed with environmental documentation needed to evaluate alternatives for a long-term drainage solution, including a permit for disposal of drainage through a constructed drain. There has been no progress on this MOU in 2 years, but Reclamation has indicated its intent to reinitiate this process.

7.5.3 *Evaluation of Other Sources of Salinity*

An evaluation of salt discharges from urban runoff and wastewater and from industrial plant discharges has been combined in this section so that the relative magnitude of these loadings can be easily compared and contrasted. In addition to loading from these sources, this program action has been expanded to include all sources of salt, except for irrigated agricultural. This expansion of scope will allow:

- Ranking of all non-agricultural sources of salt relative to one another and relative to irrigated agricultural sources.
- Inclusion of other significant salt sources, such as wetland discharges and dairies

An evaluation of salt discharges from urban runoff and wastewater and from industrial plant discharges has been combined so that the relative magnitude of these loadings can be easily compared and contrasted.

In addition, the scope has been expanded to include other beneficial uses that are affected by salinity. Environmental, agricultural, municipal, and industrial beneficial uses will be considered. Sources in the San Joaquin River, Sacramento River, and the Delta will be considered.

This action item specifies the need to evaluate loading of salt from a variety of sources and over large geographic areas. Possible approaches to perform this evaluation are:

- Compile readily available data for all sources from CALFED cooperating agencies.
- Evaluate and rank sources based on existing reports.
- Establish monitoring programs to monitor and evaluate specific sources.

Sources

The following non-agricultural sources of salinity must be quantified:

- Urban runoff
- Wastewater treatment plants
- Industrial discharges
- Wetlands
- Mine drainage
- Other sources, such as dairies and fertilizer

Note that sea water intrusion is not considered here.

Each of these sources may have individual components that will require additional study. Wastewater treatment plants, for example, may contain a large volume of salt contributed from municipal sources such as water softeners. Specific sources may be limited in geographic extent or be more significant in only one of the river basins or the Delta.

Impacts

Effects of elevated salt concentrations on the beneficial uses must be quantified. A survey of beneficial uses and impacts of salinity in the San Joaquin River Basin can be found in the Regional Board Amendment Addressing Salinity and Boron that was prepared by the CVRWQCB in 1988. The following beneficial uses are considered in the amendment:

Effects of elevated salt concentrations on the beneficial uses must be quantified.

- Drinking water and human health impacts.
- Industrial use and economic impacts.
- Agriculture uses and impacts related to productivity, increased water usage, and economics.
- Environmental uses and impacts related to aquatic habitat.

Approach to Solution

Priority Actions

Salt is widely distributed throughout the San Joaquin-Sacramento River and Delta system. Salinity of water supplies is increasing with the increased reuse of water as a means of conservation. Salt from all sources similarly affects beneficial uses (exclusive of specific ion toxicity and other specific ion sensitivities). The largest sources of salt need to be identified so that appropriate actions to reduce salt loading from these sources can be developed. Sources of salt need to be quantified and ranked in order of magnitude of impact, including an assessment of the effect of controlling specific sources on the ability to meet water quality objectives. A combination of the following approaches can be used to obtain the information necessary to evaluate the relative loading of salts.

Salinity of water supplies is increasing with the increased reuse of water as a means of conservation.

1. Evaluate and rank sources based on existing reports.

Obtain reports from cooperating CALFED agencies and other entities to generate a ranked list of salt loads:

- Quantify salt load of non-agricultural sources by type

- Quantify salt loads by region
- Identify location and magnitude of beneficial use impairment
- Identify data gaps
- Identify specific approaches to reduce loading for each type and area of discharge

After initial ranking, present a range of specific approaches that should be considered for each type and area of discharge, such as wetlands in the San Joaquin River versus wastewater treatment plants in the Sacramento River. A listing of possible solution approaches for the specific sources then can be developed, including restricted timing of releases, changes in management, and more restrictive NPDES permits.

2. Compile readily available data for all sources from CALFED cooperating agencies and other entities.
3. Compile more detailed data from cooperating agency files (such as salinity data from NPDES permits) that are not readily accessible. This step will require an increased investment in time and cost, compared to acquiring the readily available data.
4. Establish monitoring programs to monitor and evaluate specific sources.
5. Prepare a report that identifies salinity impacts, the sources that reduction measures are slated to improve, costs for improvements, and redirected impacts and associated costs.

Information Needed

The CVRWQCB is compiling load and concentration data for all sources of salt in the San Joaquin River Basin, based on a survey of NPDES permits and water quality model data. Similar data will need to be compiled for the Sacramento River Basin and the Delta.

Existing Activities

Existing activities include the SJRMP-WQS real-time management effort, the Sacramento River Watershed Program, the CVRWQCB Salinity Basin Plan Amendment Process, the CVPIA wetland water supply, the Grassland Bypass Project, and the SJVDIP.

The CVRWQCB is compiling load and concentration data for all sources of salt in the San Joaquin River Basin, based on a survey of NPDES permits and water quality model data. Similar data will need to be compiled for the Sacramento River Basin and the Delta.
